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## <sup>18</sup>F-FDG PET/CT Imaging of Parotid Gland Sarcoidosis in a Young Scandinavian Male

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### Abstract

Sarcoidosis is a multisystem granulomatous disease of unknown cause that primarily involves the lungs. Extrapulmonary sarcoidosis is seen in more than 30% of patients. We report a case of a 29-year old man presenting with bilateral enlargement of the parotid glands combined with fever, discrete dyspnea, and fatigue. Histopathology from the parotid gland indicated sarcoidosis. An <sup>18</sup>F-FDG PET/CT performed to visualize the organ extent demonstrated increased <sup>18</sup>F-FDG uptake in the parotid glands and in bilateral mediastinal and hilar lymph nodes. The patient was diagnosed with sarcoidosis.

### Introduction

Sarcoidosis is a multisystem granulomatous disorder of unknown cause that may involve any organ. Pulmonary involvement predominates as well as affection of the intrathoracic lymph nodes, eyes and skin; however it may affect any organ [1]. Extrathoracic manifestation is common and seen in more than 30% of patients, typically in combination with thoracic involvement. Sarcoidosis occurs at all ages, however with the incidence peaking at 20-39 years.

Systemic symptoms are weight loss, fatigue and night sweats but most patients present with cough and dyspnea because of pulmonary involvement. The diagnosis of sarcoidosis is based on clinical and radiological findings as well as histological findings of non-caseating epithelioid-cell granulomas. Other causes of granulomas must be ruled out. Chest radiography and computed tomography (CT) are used as routine diagnostic procedures in the evaluation of pulmonary sarcoidosis but they are unable to detect active inflammation.

<sup>18</sup>F-fluorodeoxyglucose positron-emission tomography (<sup>18</sup>F-FDG PET)/CT has shown useful in assessing the extent of organ involvement and in suggesting the organs that might be candidates for diagnostic biopsy [2]. Furthermore, <sup>18</sup>F-FDG PET/CT seems to contribute to a better evaluation of the extrapulmonary involvement and it may identify occult granulomatous lesions that are not detected by physical examination, conventional thoracic radiography or CT [3,4]. Additionally, the <sup>18</sup>F-FDG PET/CT has been compared to <sup>67</sup>Ga-scintigraphy in patients with sarcoidosis illustrating a superior sensitivity, especially in depicting sites of extrathoracic involvement [5].

Here we report a case of sarcoidosis detected by <sup>18</sup>F-FDG PET/CT.

### Case Presentation

A 29-year old man with a history of bilateral enlargement of the parotid glands, alternating fever, discrete dyspnea, and fatigue for several months was admitted to the hospital. Before admission, the patient had been examined by an otorhinolaryngologist and a fine needle biopsy from the parotid gland was conducted, demonstrating granulomas, indicative of sarcoidosis. The patient had felt enlargement of the inguinal lymph nodes but had otherwise no other discomforts. Due to suspicion of sarcoidosis, an <sup>18</sup>F-FDG PET/CT was conducted to visualize the extent of organ involvement. The <sup>18</sup>F-FDG PET/CT revealed significantly increased <sup>18</sup>F-FDG uptake in bilateral enlarged parotid glands (Figure 1A-D) and in bilateral mediastinal and hilar lymph nodes, predominantly right paratracheal adenopathy (Figure 1E-G). No enlargement or increased <sup>18</sup>F-FDG uptake was observed in the inguinal lymph nodes. Measurement of the serum angiotensin-converting-enzyme (ACE) demonstrated highly elevated level (166 U/l) (normal upper limit < 115 U/l).

The <sup>18</sup>F-FDG PET/CT findings, elevated level of serum ACE, and histopathological examination of parotid gland biopsy with non-caseating epithelioid-cell granulomas confirmed the diagnosis of sarcoidosis.

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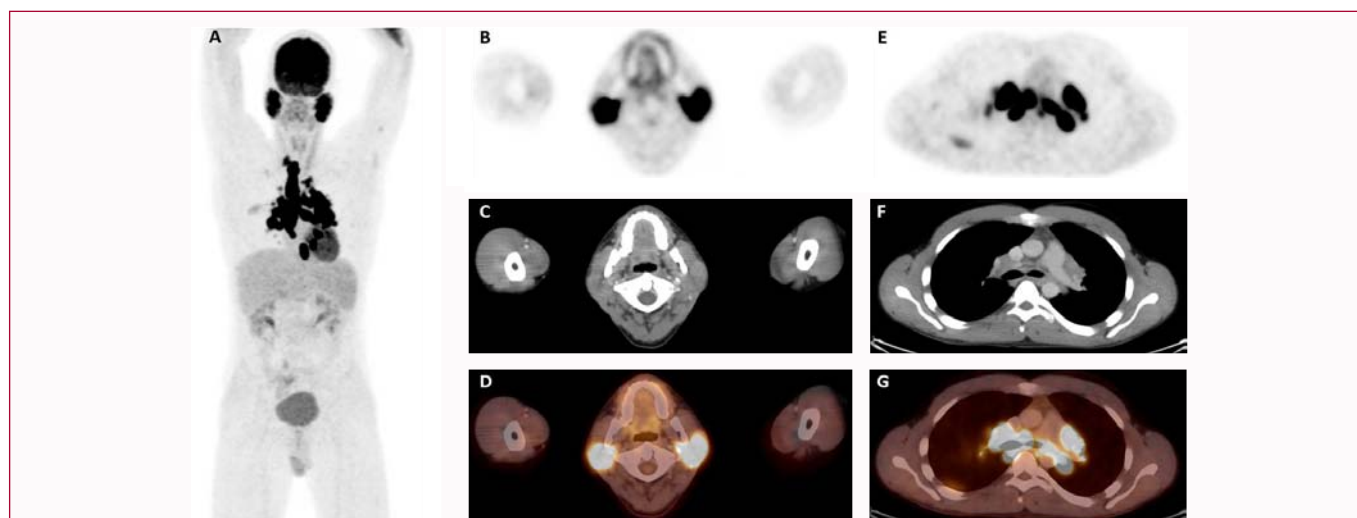
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**Figure 1:** Whole-body  $^{18}\text{F}$ -FDG PET projection (A) and transaxial  $^{18}\text{F}$ -FDG PET/CT projections demonstrated diffuse high  $^{18}\text{F}$ -FDG distribution in bilateral enlarged parotid glands (B-D) and in bilateral mediastinal and hilar lymph nodes (E-G).

As the patient's symptoms were regressing, no treatment was initiated.

## Discussion

In 1990 Sulavik and colleagues described increased symmetrical lacrimal gland and parotid gland  $^{67}\text{Ga}$ -citrate uptake combined with normal accumulation of the radionuclide in the nasopharynx ("panda" appearance) in 79% of sarcoidosis patients [6]. Furthermore, a distinctive intrathoracic lymph node  $^{67}\text{Ga}$ -uptake pattern was observed, resembling the Greek letter lambda ( $\lambda$ ). The simultaneous "lambda" and "panda" patterns were observed only in sarcoidosis patients and this was considered highly specific for sarcoidosis [6]. Therefore, it has been argued that the combination of the "lambda" and "panda" sign may obviate a histopathological examination. Enlargement of the parotid glands is rarely seen in patients with sarcoidosis (~6%) [7].

The appearance of hypermetabolic intrathoracic lymphadenopathy detected by  $^{18}\text{F}$ -FDG PET/CT in patients with sarcoidosis is comparable to the "lambda" sign on the gallium scintigraphy as well as the bilateral involvement of the parotid and lacrimal glands with high  $^{18}\text{F}$ -FDG uptake, resembling the "panda" sign [8]. The typical "panda" appearance is however partially obscured because of the high physiological  $^{18}\text{F}$ -FDG uptake of the brain. In our patient the "lambda" and "panda" signs coexisted on the  $^{18}\text{F}$ -FDG PET/CT although involvement of the lacrimal glands could not be visualized.

$^{18}\text{F}$ -FDG PET/CT is increasingly used in the diagnostic work-up of pulmonary and mediastinal tumors that are suspected to be malignant. However, sarcoid lesions can demonstrate high  $^{18}\text{F}$ -FDG uptake mimicking malignant processes such as lymphoma or lymph node metastases. Irrespective of the combination of the "lambda" and "panda" signs detected by  $^{18}\text{F}$ -FDG PET, histological confirmation should be mandatory.

In active sarcoidosis, a significant increased metabolism in the active lesions can be detected by an increased  $^{18}\text{F}$ -FDG uptake. However, after immunosuppressive therapy or spontaneous regression, the metabolism of the lesions may decrease [4,9,10], probably prior to morphological changes. Thus,  $^{18}\text{F}$ -FDG PET/CT

may be a valuable adjunct to the clinical examination in monitoring the response to therapy.

Although the serum level of ACE is elevated in up to 60% of sarcoidosis patients, it is never diagnostic since elevation can be seen in other diseases [7]. It may however decrease after corticosteroid treatment or spontaneous improvement [1]. In this patient no treatment was initiated as spontaneous regression was observed.

## Conclusion

$^{18}\text{F}$ -FDG PET/CT is valuable in demonstrating active lesions of sarcoidosis, both thoracic and extrathoracic involvement. Furthermore,  $^{18}\text{F}$ -FDG PET/CT might be useful in monitoring treatment response in patients with sarcoidosis; however, costs and radiation expose should always be taken into account.

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